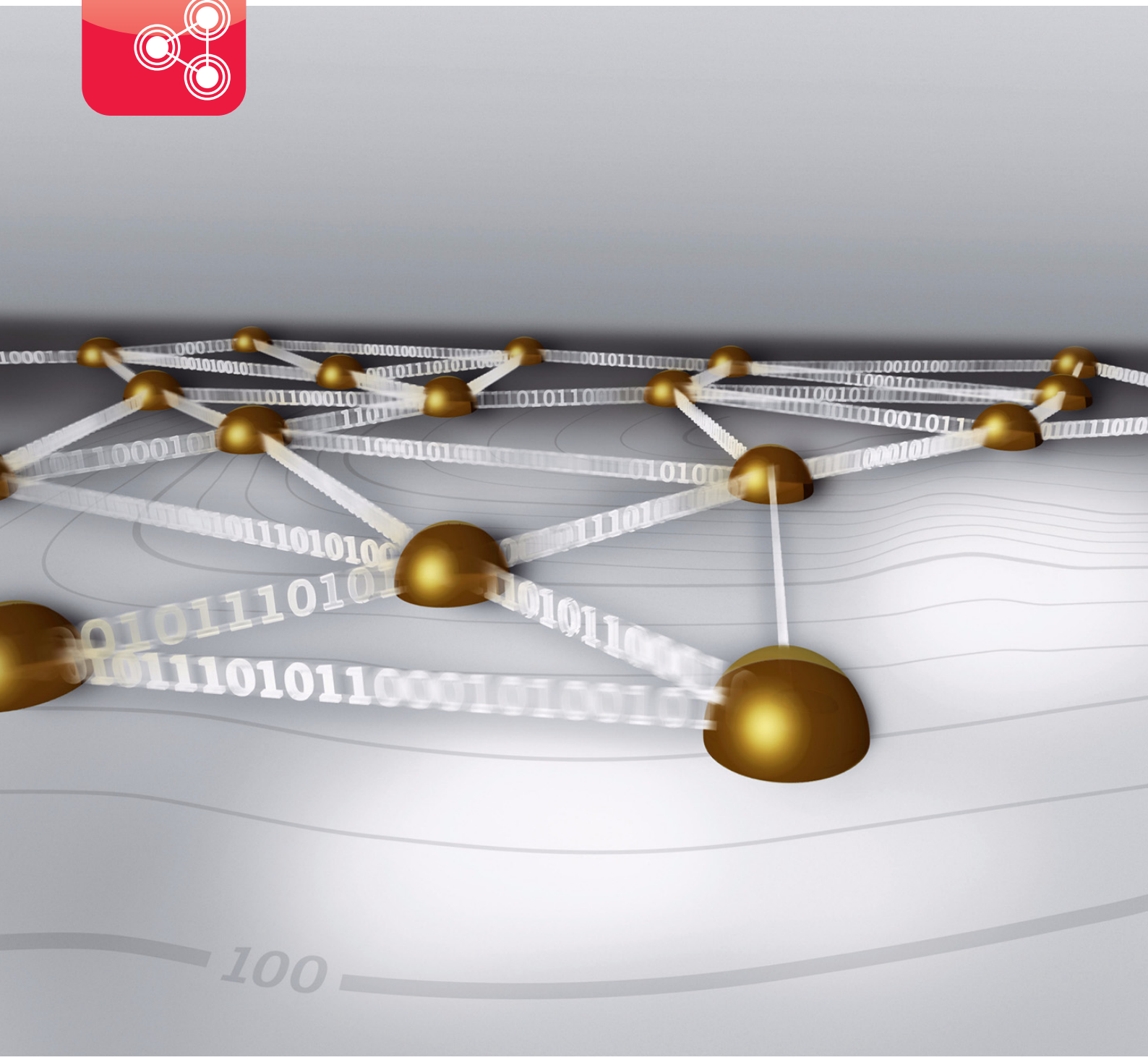
Leica GNSS Networks and Reference Stations

Technical Data - Hardware



- when it has to be **right**

Leica Geosystems

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GNSS Receivers

1 Quick overview

	GRX1200+	GRX1200 +GNSS	GR10 Basic	GR10 Performance	GR10 Professional
Supported GNSS Systems					
GPS L1 & L2 (including L2C)	●	●	●	●	●
GPS L5	○	○	○	○	●
GLONASS L1 & L2	-	○	○	○	●
Galileo L1/E5a/E5b/AltBoC	-	○	○	○	●
Position & data recording					
1Hz logging and streaming	●	●	●	●	●
2-20Hz logging and streaming	○	○	○	○	○
50Hz logging and streaming	-	-	○	○	○
RINEX logging	○	○	○	●	●
Additional licenses					
FTP Push	○	○	○	●	●
Extended Formats	●	●	○	○	○
Multi-Clients	○	○	○	●	●
Wake Up	●	●	○	○	○
Campaign	○	○	-	-	-
Extended OWI	●	●	○	○	○
Connectors/Ports					
Power Inputs (Lemo)	2	2	2	2	2
Ethernet (RJ45 ruggedized)	●	●	●	●	●
Serial (Lemo)	4	4	1	1	1
PPS	●	●	-	-	-
External Oscillator	●	●	●	●	●
Event Input	●	●	-	-	-
USB Client	-	-	●	●	●
Slot-in communication port	-	-	●	●	●
User Interface					
Power Button	●	●	●	●	●
Function Button	-	-	●	●	●
LEDs	3	3	6	6	6
Web Interface (via LAN/WAN)	●	●	●	●	●
GNSS Spider Support	●	●	●	●	●
Start-Up Configuration File	●	●	-	-	-
Dat Storage/Logging					
Memory Type	CF	CF	SD/SDHC	SD/SDHC	SD/SDHC
Memory Size	8 GB	8 GB	32 GB	32 GB	32 GB
Maximum Data Rate (Hz)	20 Hz	20 Hz	50 Hz	50 Hz	50 Hz
Proprietary (MDB)	●	●	●	●	●
RINEX (2.11) / RINEX Hatanaka	○	○	○	●	●
Additional File Compression	●	●	●	●	●
Data Streaming					
Maximum Data Rate (Hz)	20 Hz	20 Hz	50 Hz	50 Hz	50 Hz
TCP/IP Netports	3	3	20	20	20
Services					
HTTP / HTTPS	●	●	●	●	●
FTP Server	●	●	●	●	●
DHCP / DNS	-	-	●	●	●
DynDNS	●	●	●	●	●
Electrical Specifications					
Power Consumption (watts)	3.3 w	3.6 w	3.5 w	3.5 w	3.5 w
Internal Battery	●	●	-	-	-
Physical Specifications					
Size (mm)	212*166*79	212*166*79	210*190*78	210*190*78	210*190*78
Weight (kg)	1.25 kg	1.25 kg	1.50 kg	1.50 kg	1.50 kg

● Standard ○ Optional - Not Available

2 Tracking Characteristics

Instrument technology

Leica patented **SmartTrack+** technology

- Advanced measurement engine
- Jamming resistant measurements
- High precision pulse aperture mulitpath correlator for pseudorange measurements
- Excellent low elevation tracking
- Very low noise GNSS carrier phase measurements with <0.5mm precision
- Minimum acquisition time

No. of channels

GRX1200+	16 channels (Optional upgrade to 120 channels)
GRX1200+GNSS	120 channels
GR10	120 channels

Satellites signals tracking

- GPS: L1, L2, L2C, L5
- GLONASS: L1, L2
- Galileo (Test): GIOVE-A, GIOVE-B*
- Galileo: L1, E5a, E5b, Alt-BOC
- Compass**
- SBAS: WAAS, EGNOS, GAGAN, MSAS

* GIOVE-A and B tracking capability is intended for signal evaluation and test purposes only.
** The GR10 & GRX1200+ GNSS receivers are designed to support future planned signals of the Compass System. The Compass signal structure is not finalised, although test signals have been tracked with all receivers in a test environment. As changes in the signal structure may still occur, Leica Geosystems cannot guarantee full Compass compatibility.

GNSS measurements

Fully independent code and phase measurements of all frequencies

GPS

Type	L1	L2	L5
All receivers	Carrier phase, C/A-code	Carrier phase, C code (L2C) and P2-code	Carrier phase, code

GLONASS

Type	L1	L2
All receivers*	Carrier phase, C/A-code	Carrier phase, P2-code

Galileo

Type	L1	E5a	E5b	Alt-BOC
All receivers*	Carrier phase, code	Carrier phase, code	Carrier phase, code	Carrier phase, code

* For GRX1200+ receivers an upgrade kit (to GRX1200+GNSS) is required to track GLONASS and Galileo.

GPS Carrier tracking

Type	L1, AS off or on	L2, AS off	L2, AS on
All receivers	Reconstructed carrier phase via C/A-code.	Reconstructed carrier phase via P2-code.	Switches automatically to patented P-code aided technique providing full L2 reconstructed carrier phase.

GPS code measurements

Type	L1, AS off L1, AS off	L2, AS off	L2, AS on
All receivers	Carrier phase smoothed code measurements: C/A-code.	Carrier phase smoothed code measurements: P2-code and/or L2C code.	Carrier phase smoothed code measurements: Patented Pcode aided code and/or L2C code.

Carrier phase and code measurements on L1, L2 and L5 (GPS) are fully independent of AS on or off.

2.1 Measurement Precision

Measurement precision

Type	Carrier phase	Code (pseudorange)
All receivers*	L1: 0.2 mm rms L2: 0.2 mm rms	L1: 20 mm rms L2: 20 mm rms

* GPS L5 and Galileo L1/E5a/E5b/AltBOC values are expected to be similar to L1. Final values will be determined after initial operational capability (IOC) has been reached.

2.2 Measurement Resolution

Measurement resolution

Type	Resolution phase	Resolution code
All receivers	0.01 mm	0.0005 m

2.3 Accuracy

Accuracy is dependent upon various factors including the number of satellites tracked, constellation geometry, observation time, ephemeris accuracy, ionospheric disturbance, multipath and ambiguity resolution.
The following accuracies, given as **r**oot **m**ean **s**quare, are based on measurements processed using Leica Geo Office and the Bernese Software.
The use of multiple GNSS systems can increase accuracy by up to 30% relative to GPS only.

Accuracy (rms) in single receiver navigation mode

Navigation accuracy 5–10 m rms for each coordinate
Degradation possible due to Selective Availability

Acuuracy in differential code mode

The baseline precision of a differential code solution for static and kinematic surveys is 25 cm.

Accuracy in differential phase mode

Normal baseline (up to 30 km) with GR10/GRX1200+ Series plus AS10

Static		Kinematic	
Horizontal	Vertical	Horizontal	Vertical
5 mm + 0.5 ppm	10 mm + 0.5 ppm	10 mm + 1 ppm	20 mm + 1 ppm

Long baseline (over 30 km) with GR10/GRX1200+ Series plus AR25/AR10

Static	
Horizontal	Vertical
3 mm + 0.5 ppm	6 mm + 0.5 ppm

Note: The above values based on post processing using Leica Geo Office. With Leica Geo Office processing software the GLONASS option is needed to process GLONASS data.

Note: Using specialist scientific software (Bernese) available from Leica Geosystems the following accuracies can be achieved in static post processing mode, even on very long baselines:

- < 4 mm in plan
- <6 mm in height

3 Data recording

Data recording

	GRX1200+	GRX1200+GNSS	GR10
Date Storage			
Storage Type (removable)	CF (yes)	CF (yes)	SD/SDHC (yes)
Logging channels	2	2	10
Primary data logging	●	●	-
Ring Buffer	●	●	-
Multi session logging	-	-	●
Auto-delete	●	●	●
Smart Clean-up	-	-	●
User defined folders	-	-	●
Data Types			
Leica raw (MDB)	●	●	●
RINEX 2.11	○	○	●
Hatanaka	○	○	●
Zipping of raw files	●	●	●
Zipping of RINEX files	●	●	●
File Sizes			
Maximum	24 hr	24 hr	24 hr
Minimum	1 min	1 min	5 min
Data Rates			
Maximum (MDB)	20 Hz	20 Hz	50 Hz
Maximum (RINEX)	20 Hz	20 Hz	20 Hz
Minimum (MDB+RINEX)	300 s	300 s	300 s
Logging Type			
Continuous	●	●	●
Timed	●	●	●

● Standard ○ Optional - Not Available

RINEX logging when configured will generate files in real time. On the GR10 RINEX files can be logged independently without the need to log raw Leica MDB files.

Note : For the GR10 Basic RINEX logging is optional.

4 Data Streaming

Data streaming

	GRX1200+	GRX1200+GNSS	GR10
Data Streaming			
Maximum number of streams	7	7	20
Maximum number of real time streams	2	2	10
Streaming Ports			
Serial ports	4	4	1
TCPIP net ports	3	3	20
USB client port	-	-	1
Slot communication port	-	-	1
Data Types and rates			
Leica	10 Hz	10 Hz	10 Hz
Leica 4G	10 Hz	10 Hz	10 Hz
RTCM 2.1, 2.2 and 2.3	10 Hz	10 Hz	10 Hz
RTCM 3.0 and 3.1	10 Hz	10 Hz	10 Hz
CMR/CMR+	10 Hz	10 Hz	10 Hz
BINEX records 0x00, 0x01, 0x7d, 0x7e, 0x7f	20 Hz	10 Hz	10 Hz
Leica Proprietary LB2	20 Hz	20 Hz	50 Hz
NMEA 0183 v2.20 and Leica Proprietary	20 Hz	20 Hz	10 Hz
Multi Clients			
Clients per net port	10[1]	10[1]	10[2]
Time slicing of RTK output	●	●	●

● Standard ○ Optional - Not Available

1 Requires Multi Client option
2 Requires Multiplex option

5 Memory

Memory Type

Type	Card	Capacity
GRX1200+	Compact Flash (CF)	Up to 8 GB
GRX1200+GNSS	Compact Flash (CF)	Up to 8 GB
GR10	Secure Digital (SD and SDHC)	Up to 32 GB

Data capacity
All receivers

Data can be recorded on the CF/SD card.
The figures shown are accurate to about 1%. They are dependent on the tracking settings configured on the instrument.

4 GB card, GPS (L1+L2+L5), 12 satellites

Receiver	Rate	MDB only	RINEX only	Hatanaka only
All receivers	1 s	2180 h 3700 h zipped	450 h 1700 h zipped	1700 h 4500 h zipped
	30 s	56550 h 95780 h zipped	12650 h 47380 h zipped	49700 h 108000 h zipped

4 GB card, GPS + GLONASS (L1+L2), 12/10 satellites

Receiver	Rate	MDB only	RINEX only	Hatanaka only
All receivers	1 s	1400 h 2400 h zipped	330 h 1240 h zipped	1220 h 3280 h zipped
	30 s	38400 h 65000 h zipped	9100 h 34000 h zipped	36400 h 74800 h zipped

4 GB card, GPS + GLONASS + Galileo (L1+E5a+E5b+AltBOC), 12/10/10 satellites

Receiver	Rate	MDB only	RINEX only	Hatanaka only
All receivers	1 s	840 h 1400 h zipped	185 h 700 h zipped	680 h 1800 h zipped
	30 s	23800 h 40300 h zipped	5050 h 19000 h zipped	20400 h 41350 h zipped

6 User interface

Buttons/LEDs

	GRX1200+	GRX1200+GNSS	GR10
ON / OFF button	•	•	•
Function button	-	-	•
LEDs	3	3	6

Web Interface

Both the GRX1200+ series and GR10 series have integrated web interface functionality that provides full status information and configuration options. The web interface contains a detailed Event/Message log that keeps the user informed of all important activities. The web interface also contains a detailed built in online help.

GNSS Spider

Both the GRX1200+ series and GR10 series can be configured and maintained using the Leica GNSS Spider Software.

6.1 GR10 User Interface

GR10 button functionality

- Receiver power up/power down
- Start/stop all logging sessions
- Start/stop all data streams
- Initialize the measurement engine
- Reset receiver settings
- Format SD card

GR10 LED status indicator

- Power LED
- SD card LED
- Raw data logging LED
- RT out data stream LED
- RT in data stream LED
- Position LED

6.2 GRX1200+ / GRX1200+GNSS User Interface

GRX1200+ / GRX1200+ GNSS button functionality

- Receiver power up/power down

GRX1200+ / GRX120+ GNSS LED status indicator

- TRK: Tracking LED
- MEM: Memory LED
- PWR: Power LED

6.3 Operation

Internet connectivity

Web interface for remote configuration, operation and status displays. Supports HTTP and HTTPS. The GR10 additionally supports DHCP/DNS and unique hostname.

Web interface ports
- Ethernet port
- GPRS via mobile internet
- Serial Port (PPP) – GRX1200 series only
- USB Client Port – GR10 series only
- Simultaneous access over Ethernet port is fully supported

Security Access restrictions configurable in User Management component:
- Viewers (status only)
- Users/GNSS Managers (configuration and status)
- Administrators
- SSL encryption

E-Mail
Sending of message log in scheduled intervals over email. Ethernet and PPP connection to the internet is supported

FTP Push (optional)
Automated FTP Push of raw data and/or RINEX files to a remote FTP server. Ethernet and PPP connection to the internet is supported

RTK Multiplexing / Multi Client
Option to allow RTK data streaming direct from the sensor, via TCPIP, for up to 10 clients per TCP/IP port.

DynDNS
Allows receiver addressing with dynamic IP address through a static host name. Requires registration with a DynDNS service

OWI interface

Leica proprietary Outside World Interface - OWI – for receiver control commands from PC etc, for receiver configuration, control and status, e.g. using Leica GNSS Spider. Binary and ASCII version of the OWI protocol are available. Supported via serial and Ethernet ports. Simultaneous access, control and message output is fully supported. OWI is available per default on the GRX1200+ series. On the GR10 OWI use requires a license to be used with third party software. Using the GR10 with GNSS Spider does not require the OWI option.

Startup configurator

GRX1200+ and GRX1200+GNSS only

Initial configuration and query of serial ports settings, Ethernet port and address settings using a simple ASCII text file on the CF card.
Set and query Serial port settings
- PPP on RX port
- Ethernet settings
- Web Server settings
- DynDNS settings
- Query MAC address

RX1200/CS09 controllers

GRX1200+ and GRX1200+GNSS only

The RX1200/CS09 controllers can be used for initial receiver configuration and status information display. With the Campaign option, GRX1200+ receivers can be used for field campaigns for static raw data logging.

7 Connectors, Ports and Devices

7.1 Connector ports overview

Connector ports

GRX1200+ and GRX1200+GNSS only

Type	Description
Power	Lemo-1 female, 5 pin
Serial RS232	4X Lemo- 4 female, 8 pin
GNSS Antenna	1x TNC female
PPS output	1x Lemo ERN.OS.250.CTL
Event input	1x Lemo HGP.00.250.CTL
External Oscillator	1x MMCX female, 24QMA-50-2-3/133,5/10 Mhz
Ethernet	1x RJ45 ruggedised, 10/100 Mbit

GR10

Type	Description
Power	1x Lemo-1 female, 5 pin
Serial P1	1x Lemo-1 female, 8 pin
GNSS Antenna	1x TNC female
Communication Slot Port	1x UART Serial/USB for removable internal communication devices
P3 Slot-in Antenna	1x TNC female
External Oscillator	1x MMCX female, 24QMA-50-2-3/133,5/10 Mhz
Ethernet	1x RJ45 ruggedised, 10/100 Mbit
USB	USB device (Mini B)

Data links

	GRX1200+	GRX1200 +GNSS	GR10
Serial data ports	4	4	1
USB data ports (TCP/IP)	-	-	20
Slot device ports	-	-	1
TCP/IP net ports	3	3	20
Simultaneous data streams	7	7	20
Concurrent RTK formats	2	2	10

7.2 Connectors

GNSS Antenna

All receivers

Connector	TNC female
Output voltage	5.0 v DC nominal
Maximum output current	150 mA
Maximum cable loss	12 dB
Recommended antennas	AR25 / AR10 / AT504GG / AT504 / AS10 / AX120x.
Other antennas	Older legacy Leica antennas can also be used. Some third party antennas can also be used. Third party antennas might require an additional inline amplifier or attenuator.

Power port

All receivers

Description	5 pin LEMO supporting dual power inputs
Connector	LEMO-1, 5 pin, LEMO HMG.1B.305.CLNP

Ethernet network interface

All receivers

IEEE Standard	8002.3 10BASE-T Ethernet 802.3u 100BASE-TX Fast Ethernet 802.3 Auto-negotiation
Link Speed	10/100 MB Half/Full Duplex
Protocol	CSMA/CD
Connector	Ruggedised RJ45

Serial ports

All receivers

Description	8 pin LEMO supporting 2400-115200 baud, incl. RTS/CTS
Default setting	115200/N/8/1/N
Connector (P1/P2/P3)	LEMO-1, 8 pin, LEMO HMA.1B.308.CLNP
On GRX1200 only:	
Connector (RX)	LEMO-1, 8 pin, LEMO HMI,1B.308.CLNP

External oscillator

All receivers

Frequency	5 MHz or 10 MHz
Input impedance	50 Ω nominal
Input VSWR	2:1 maximum
Signal level	0 dBm minimum to +13.0 dBm maximum
Frequency stability	+0.5 ppm maximum
Wave shape	Sinusoidal
Connector	MMCX female – 24QMA-50-2-3/133

On the GR10 please remove the External oscillator port cover before connecting the cable.

Pulse Per Second (PPS)

GRX1200+ and GRX1200+GNSS only

Peak	3.3 V= High
Impedance	50 Ω
Pulse length	1 ms Leading edge Coinciding with the beginning of each epoch
Positive/negative edge	Selectable via CS09/RX1200 controller or Web interface.
Cable connectivity	Matched with an appropriate impedance of 50 Ω
Connector	LEMO ERN.OS.250.CTL

Event input

GRX1200+ and GRX1200+GNSS only

Pulse type	TTL, positive or negative going pulse
Pulse length	125 ns at minimum
Voltage	TTL level, ~ 5 V, min. 3.3 V
Pin definition	Centre = signal, Case = ground
Connector	LEMO HGP.00.250.CTL

USB Device Port

GR10 only

USB	Full Speed USB
Connector	Mini B

7.3 Communications Devices

The GRX1200+ Series and the GR10 Series both support a variety of communications devices. All receivers support the use of external serial devices. Leica Geosystems offers many devices in external ruggedised GFU housings. Additionally the GR10 supports the use of removable slot in communication devices.

Supported Radio modems

- Support of any suitable UHF / VHF radio with RS232 interface and operating in transparent mode
- Satelline3AS in Leica GFU housing, fully sealed and protected, IP67
- Pacific Crest PDL in Leica GFU housing, fully sealed and protected, IP67

Supported GSM / UMTS (HSDPA) phone modems

- Support of any suitable GSM / GPRS / UMTS(HSDPA) modem
- Siemens MC75 in Leica GFU housing, Quad-Band 850 / 900 / 1800 / 1900 MHz fully sealed and protected, IP67

Supported CDMA phone modems

- Support of any suitable CDMA modem
- Multitech MTMMC CDMA in Leica GFU housing, Dual-Band 800 / 900 MHz, 1xRTT, fullysealed and protected, IP67

Supported Landline phone modems

- Support of any suitable Landline phone modem, based on US Robotics or Courier V.90.

Supported Slot in devices for GR10

- Support of a variety of removable slot in devices on the GR10.
- Satelline TA11 radio, 403-470 MHz TXO
- Telit 3G GSM/GPRS/UMTS module, 5-Band 850/900/1800/1900/2100 MHz
- Cinterion MC75i GSM/GPRS/EDGE module, 4-Band 850/900/1800/1900 MHz

7.4 External Controllers

Optional controllers can be used to configure the receivers. For full control of the GRX1200+ and GR10 receiver users should use the receiver Web Interface.

GRX1200+ Series

- The GRX1200+ can be fully configured for Campaign work using the RX1200 or CS09 controllers for static raw data logging.

GR10

- The GR10 has a built in web server software called RefWorx. Any Web enabled device can be used to configure the GR10. The CS10/15 controllers can be used to configure the GR10 using the built in web browser and a USB connection to the GR10.

8 Ethernet Services

Services

	GRX1200+	GRX1200 +GNSS	GR10
TCP/IP	●	●	●
Static IP	●	●	●
DHCP	-	-	●
DNS	●	●	●
Hostname support	-	-	●
DynDNS	●	●	●
HTTP	●	●	●
HTTPS	●	●	●
User defined HTTP port	●	●	●
User defined HTTPS port	●	●	●
Secure SSL	●	●	●
Custom SSL certificates	-	-	●
FTP Server	●	●	●
User defined FTP ports	●	●	●
Passive mode FTP	●	●	●
Active mode FTP	●	●	●
Simultaneous FTP clients	3	3	6
Anonymous FTP	●	●	●
FTP push	○	○	●
File download via HTTP	●	●	●
TCP/IP server	●	●	●
NTRIP server (source)	●	●	●
PPP over serial	●	●	-
TCP/IP over USB	-	-	●
Web interface event log	●	●	●
Email alerts	●	●	●

● Standard ○ Optional - Not Available

On the GR10 Basic FTP Push is optional

9 Weight & Dimensions

Dimensions

The dimensions are given for the housing without the sockets.

Type	Length (mm)	Width (mm)	Thickness (mm)
GRX1200+	212	166	79
GRX1200+GNSS	212	166	79
GR10	210, 220*	190, 200*	78, 94*

* With bumpers

Weight

GRX1200+: 1.25 kg
GRX1200+GNSS: 1.25 kg
GR10: 1.50 kg, 1.67 kg *
* With bumpers

10 Environmental specifications

Environmental specifications

Temperature

Type	Operating temperature [°C]	Storage temperature [°C]
GRX1200+	-40 to +65	-40 to +80
GRX1200+GNSS	-40 to +65	-40 to +80
GR10	-40 to +65	-40 to +80
Leica SD cards	-40 to +85	-40 to +85
Leica CF cards	-40 to +85	-40 to +85

Compliance with ISO9022-10-08, ISO9022-11-special, MIL-STD-810F – 502.4-II, MIL-STD-810F – 501.4-II (operating) and MIL MIL-STD-810F – 502.4-I, MIL-STD-810F – 501.4-I (storage).

Protection against water, dust and sand

Type	Protection
All receivers	IP67 (IEC 60529) and MIL STD 810F Dust tight Protected against water jets Waterproof to 1 m temporary immersion

Humidity

Type	Protection
All receivers	Up to 100% Compliance with ISO9022-13-06, ISO9022-12-04 and MIL-STD-810F Method 507.4-I The effects of condensation are to be effectively counteracted by periodically drying out the product

Vibration

Type	Protection
All receivers	Withstands strong vibration during operation, compliance with ISO9022-36-08 and MIL STD 810F – 514.5-Cat.24

Drops

Type	Protection
All receivers	Withstands 1m drop onto hard surfaces

11 Power & Electrical Certifications

Supply voltage

Nominal 12 V DC , voltage range 10.5 V-28 V DC

Power consumption

GRX1200+	3.2 W typically, 12 V@270 mA
GRX1200+GNSS	3.2 W typically, 12 V@270 mA
GR10	3.5 W typically, 24 V@150 mA

Operating times

All receivers designed for continuous operation.

Power supply

All receivers	Dual input Up to two external power sources can be connected simultaneously. For the GRX1200+ Series, it is possible to configure one as the primary power input and the other as backup power source.

Batteries

	GRX1200+	GRX1200+GNSS	GR10
Battery internal	•	•	-
Battery external	•	•	•

Internal

Type	Rechargeable Li-Ion battery 3.8Ah/7.2V. An internal plug-in battery can be used for temporary set ups. 1 battery fits into GRX1200+/GRX1200+ GNSS.
Voltage	7.4 V
Capacity	GEB221: 4.4 Ah
Weight	0.2 kg
Operation time	Powers receiver plus antenna for about 8 hrs.

External

Type	Rechargeable 8Ah/12V NiCd External power supply unit Power-supply unit for GPS/GNSS receiver, for indoor use only, input 100V-240VAC 50-60HZ, output 12VDC. Ideal for continuous receiver operation.
Voltage	12 V
Capacity	GEB171: 9.0 Ah
Weight	2.1 kg
Operation time	Powers receiver plus antenna for about 25hrs.

Certifications

Compliance to	FCC, CE Local approvals (as IC Canada, C-Tick Australia, Japan, China)

GNSS Antennas

12 GNSS Antennas

Description and use

The antenna is selected for use based upon the application. The table below gives a description and the intended use of the individual antennas.

Type	Description	Use
AR25	Dorne & Margolin GPS, GLONASS, Galileo, Compass antenna element with 3D choke ring ground plane. Optional protective radome.	High end applications. For example, monitoring tectonic plate movements, first order control and reference station applications.
AT504 GG	Dorne & Margolin GPS, GLONASS L1/L2 antenna element with gold anodized choke ring ground plane. Complies with IGS type 'T' antenna, JPL design. Optional protective radome.	High end applications. For example, monitoring tectonic plate movements, first order control and reference station applications.
AR10	GPS, GLONASS, Galileo, Compass reference station antenna with large ground plane and built-in radome.	General use for standard and high accuracy reference station and monitoring applications.
AS10	Compact geodetic GPS, GLONASS, Galileo antenna with built-in ground plane.	Standard network RTK and monitoring applications.

Dimensions

Type	AR25	AT504 GG	AR10	AS10
Height	20.0 cm	14.0 cm	14.0 cm	6.2 cm
Diameter	38.0 cm	38.0 cm	24.0 cm	17.0 cm

Connector

AR25:	N-Type female, with TNC adapter supplied
AT504 GG:	N-Type female, with TNC adapter supplied
AR10:	TNC female
AS10:	TNC female

Mounting

All antennas: 5/8" Whitworth Thread

Weight

Type	AR25	AT504 GG	AR10	AS10
Weight	7.6 kg, radome 1.1 kg	4.3 kg, radome 1.1 kg	1.1 kg	0.4 kg

Electrical data

Type	AR25	AT504 GG	AR10	AS10
Voltage	3.3 V to 12 V DC	4.5 V to 18 V DC	3.3 V to 12 V DC	4.5 V to 18 V DC
Current	100 mA max	50 mA typical	100 mA max	35 mA typical
Frequency GPS: GLONASS: Galileo: Compass:	 L1, L2 (including L2C), L5. L1, L2, L3. E2-L1-E1, E5a, E5b, E5a+b (Alt-BOC), E6. B1, B2, B3.	 L1, L2 (including L2C). L1, L2. - -	 L1, L2 (including L2C), L5. L1, L2, L3. E2-L1-E1, E5a, E5b, E5a+b (Alt-BOC), E6. B1, B2, B3.	 L1, L2 (including L2C), L5. L1, L2. E2-L1-E1, E5a, E5b, E5a+b (Alt-BOC). B1, B2.
Gain (typically)	40 dBi	29 dBi	29 dBi	27 dBi
Noise Figure (typically)	< 1.2 dBi max	3 dBi	< 1.8 dBi	< 2 dBi
Phase center stability	< 1mm	< 1mm	< 1mm	< 1mm

Environmental specifications

Temperature

Type	Operating temperature [°C]	Storage temperature [°C]
AR25	-55 to +85	-55 to +90
AT504 GG	-40 to +70	-40 to +70
AR10	-40 to +70	-55 to +85
AS10	-40 to +70	-55 to +85

Operating temperatures in compliance with
ISO9022-10-08, ISO9022-11-05 and
MIL-STD-810F, Method 502.4-II, MIL-STD-810F, Method 501.4-II

Storage temperatures in compliance with
ISO9022-10-08, ISO9022-11-06 and
MIL-STD-810F, Method 502.4-II, MIL-STD-810F, Method 501.4-II

Protection against water, dust and sand

Type	Protection
All antennas	IP67 (IEC 60529) Dust tight Protected against water jets Waterproof to 1 m temporary immersion

Humidity

Type	Protection
All antennas	Up to 100% Compliance with ISO9022-13-06, ISO9022-12-04 and MIL-STD-810F Method 507.4-I The effects of condensation are to be effectively counteracted by periodically drying out the product

Vibration

Type	Rating
AR25/	ISO9022-3, 10 to 55 Hz, 2 g, ±0.15 mm
AT504 GG/	ISO9022-36-08 and MIL-STD-810F Method 514.5-Cat.24
AR10	ISO9022-3, 10 to 55 Hz, 2 g, ±0.15 mm
AS10	ISO9022-36-08 and MIL-STD-810F Method 514.5-Cat.24

Drops

AR25:	Withstands 0.6m drop onto hard surfaces
AT504 GG:	Withstands 0.6m drop onto hard surfaces
AR10:	Withstands 1.2m drop onto hard surfaces
AS10:	Withstands 1.5m drop onto hard surfaces

Cable length

Available cable lengths for all antennas [m]
1.2, 2.8, 10, 30, 50 and 70.

Whether providing corrections from just a single reference station, or an extensive range of services from a nationwide RTK network - innovative reference station solutions from Leica Geosystems offer tailor-made yet scalable systems, designed for minimum operator interaction whilst providing maximum user benefit. In full compliance with international standards, Leica's proven and reliable solutions are based on the latest technology.

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